

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please replace the current listing of claims with the following replacement listing of claims.

1. (Currently Amended) A method of applying scatter and attenuation correction to emission tomography images of a region of interest of a subject under observation comprising the steps of:

aligning a three-dimensional computer model in the form of a two-component atlas representing the density distribution within said region of interest with said emission tomography images, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

applying scatter and attenuation correction to said emission tomography images using said aligned computer model as a guide.

2. (Cancelled)

3. (Currently Amended) The method of claim 2 1 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

4. (Original) The method of claim 3 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

5. (Original) The method of claim 4 wherein said region of interest is the head and wherein said functional component is the brain component of a head atlas.

6. (Original) The method of claim 4 wherein said region of interest is the heart, said functional component of said atlas simulating a cardiac image and said anatomical component of said atlas representing anatomical features of the thorax.
7. (Original) The method of claim 6 wherein the anatomical features of the thorax include:
soft-tissues such as the heart, liver, muscle, and fat;
very low-density soft-tissues such as the lungs; and
high-density tissues such as bone and cartilage in the ribs and spine.
8. (Original) The method of claim 3 further comprising the step of selecting an atlas from a database of atlases prior to performing said aligning step.
9. (Original) The method of claim 8 wherein said selecting step is performed manually.
10. (Original) The method of claim 8 wherein said selecting step is performed automatically based on the degree of registration of each atlas in said database with said emission tomography images.
11. (Original) The method of claim 10 wherein the degree of registration is determined by:
performing a preliminary reconstruction of each atlas; and
registering the atlas to the preliminary reconstruction.
12. (Original) The method of claim 10 further comprising the step of combining multiple atlases to yield a resultant atlas that better registers with said emission tomography images.
13. (Original) The method of claim 8 wherein said database includes disease specific atlases, physical trait specific atlases and/or tracer or lesion specific atlases.
14. (Currently Amended) An emission tomography imaging method where emission tomography images of a region of interest of a subject are taken for analysis and are corrected for scatter and attenuation, the method further comprising the step of:

using a three-dimensional computer model in the form of a two-component atlas approximating the density distribution within the region of interest as a guide to the application of scatter and attenuation correction, said computer model being created from image data of other subjects thereby to avoid the need to image said subject to create said computer model.

15. (Cancelled)

16. (Currently Amended) The emission tomography imaging method of claim ~~15~~ 14 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

17. (Original) The emission tomography imaging method of claim 16 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

18. (Currently Amended) An emission tomography image processing system comprising:
memory storing emission tomography images of a region of interest of a subject under observation;

said memory also storing at least one three-dimensional computer model of said region of interest, said computer model being in the form of a two-component atlas and representing the density distribution within said region of interest, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

a processor for registering said computer model with said emission tomography images and for applying scatter and attenuation correction to said emission tomography images using said registered computer model as a guide.

19. (Cancelled)

20. (Currently Amended) An emission tomography image processing system as defined in claim ~~19~~ 18 wherein said processor firstly registers a functional component of said atlas with said emission tomography images to generate a set of spatial transformation parameters and then registers an anatomical component of said atlas with said emission tomography images using said set of spatial transformation parameters.

21. (Original) An emission tomography image processing system as defined in claim 20 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

22. (Original) An emission tomography image processing system as defined in claim 21 wherein said memory stores a database of atlases.

23. (Original) An emission tomography image processing system as defined in claim 22 wherein said processor selects an atlas from said database automatically based on the degree of registration of each atlas in said database with said emission tomography images.

24. (Original) An emission tomography image processing system as defined in claim 23 wherein said processor performs a preliminary reconstruction of each atlas and registers the atlas to the preliminary reconstruction to determine the degree of registration of each atlas.

25. (Original) An emission tomography image processing system as defined in claim 23 wherein said processor combines multiple atlases to yield a resultant atlas that better registers with said emission tomography images.

26. (Original) An emission tomography image processing system as defined in claim 22 wherein said database includes disease specific atlases, physical trait specific atlases and/or tracer or lesion specific atlases.

27. (Currently Amended) An emission tomography imaging system comprising:

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means for taking emission tomography images of a region of interest of a subject under observation to form a three-dimensional image of said region of interest;

memory to store said emission tomography images, said memory also storing at least one three-dimensional computer model of said region of interest, said computer model being in the form of a two-component atlas and representing the density distribution within said region of interest, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

a processor for aligning said computer model with said emission tomography images and for applying scatter and attenuation correction to said emission tomography images using said aligned computer model as a guide.

28. (Currently Amended) A computer readable medium including computer program code for applying scatter and attenuation correction to emission tomography images of a region of interest of a subject under observation, said computer readable medium including:

computer program code for aligning a three-dimensional computer model representing the density distribution within said region of interest with said emission tomography images, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

computer program code for applying scatter and attenuation corrections to said emission tomography images using said aligned computer model as a guide, wherein said computer program code for aligning includes:

computer program code for aligning a functional component of said computer model simulating a SPECT or PET scan of said region of interest and for generating a set of spatial transformation parameters; and

computer program code for aligning an anatomical component of said computer model simulating a transmission scan of said region of interest using said set of spatial transformation parameters.

29. (Cancelled)

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30. (Previously Presented) The method of claim 1 wherein said computer model is created from transmission images or x-ray CT scans of the region of interest of other subjects.

31. (Previously Presented) The method of claim 30 wherein said transmission images or x-ray CT scans are taken from a variety of other subjects and averaged thereby to create said computer model.

32. (Cancelled)

33. (Currently Amended) The method of claim ~~32~~ 31 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

34. (Previously Presented) The method of claim 33 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

35. (Previously Presented) The method of claim 14 wherein said computer model is created from transmission images or x-ray CT scans of the region of interest of other subjects.

36. (Previously Presented) The method of claim 35 wherein said transmission images or x-ray CT scans are taken from a variety of other subjects and averaged thereby to create said computer model.

37. (Cancelled)

38. (Currently Amended) The method of claim ~~37~~ 36 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component

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of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

39. (Previously Presented) The method of claim 38 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

40. (Previously Presented) A method of applying scatter and attenuation correction to emission tomography images of a region of interest of a subject under observation comprising the steps of:

aligning a three-dimensional computer model in the form of a two-component atlas representing the density distribution within said region of interest with said emission tomography images; and

applying scatter and attenuation correction to said emission tomography images using said aligned computer model as a guide.

41. (Previously Presented) The method of claim 40 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

42. (Previously Presented) The method of claim 41 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

43. (Previously Presented) The method of claim 42 further comprising the step of selecting an atlas from a database of atlases prior to performing said aligning step.

44. (Previously Presented) The method of claim 40 wherein said computer model is created from transmission images or x-ray CT scans of the region of interest of other subjects.

45. (Previously Presented) The method of claim 44 wherein said transmission images or x-ray CT scans are taken from a variety of other subjects and averaged thereby to create said computer model.

46. (Previously Presented) An emission tomography imaging method where emission tomography images of a region of interest of a subject are taken for analysis and are corrected for scatter and attenuation, the method further comprising the step of:

using a three-dimensional computer model in the form of a two-component atlas approximating the density distribution within the region of interest as a guide to the application of scatter and attenuation correction.

47. (Previously Presented) The emission tomography imaging method of claim 46 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

48. (Previously Presented) The emission tomography imaging method of claim 47 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

49. (Previously Presented) An emission tomography image processing system comprising:
memory storing emission tomography images of a region of interest of a subject;

said memory also storing at least one three-dimensional computer model of said region of interest, said computer model being a two-component atlas representing the density distribution within said region of interest; and

a processor for registering said computer model with said emission tomography images and for applying scatter and attenuation correction to said emission tomography images using said registered computer model as a guide.

50. (Previously Presented) An emission tomography image processing system as defined in claim 49 wherein said processor firstly registers a functional component of said atlas with said emission tomography images to generate a set of spatial transformation parameters and then registers an anatomical component of said atlas with said emission tomography images using said set of spatial transformation parameters.

51. (Previously Presented) An emission tomography image processing system as defined in claim 50 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

52. (Previously Presented) An emission tomography image processing system as defined in claim 51 wherein said memory stores a database of atlases.

53. (Previously Presented) The method of claim 49 wherein said computer model is created from transmission images or x-ray CT scans of the region of interest of other subjects.

54. (Previously Presented) The method of claim 53 wherein said transmission images or x-ray CT scans are taken from a variety of other subjects and averaged thereby to create said computer model.

55. (Currently Amended) An emission tomography imaging method comprising the steps of:
obtaining emission tomography images of a region of interest of a subject under observation;
aligning a three-dimensional computer model in the form of a two-component atlas representing the density distribution within said region of interest with said emission tomography images without requiring said subject to be imaged to create said computer model; and
applying scatter and attenuation correction to said emission tomography images using said aligned computer model as a guide.

56. (Cancelled)

57. (Currently Amended) The method of claim ~~56~~ 55 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

58. (Previously Presented) The method of claim 57 wherein said functional component simulates a SPECT or PET scan of said region of interest and wherein said anatomical component simulates a transmission scan of said region of interest.

59. (Previously Presented) The method of claim 58 wherein said region of interest is the head and wherein said functional component is the brain component of a head atlas.

60. (Previously Presented) The method of claim 58 wherein said region of interest is the heart, said functional component of said atlas simulating a cardiac image and said anatomical component of said atlas representing anatomical features of the thorax.

61. (Previously Presented) The method of claim 60 wherein the anatomical features of the thorax include:

- soft-tissues such as the heart, liver, muscle, and fat;
- very low-density soft-tissues such as the lungs; and
- high-density tissues such as bone and cartilage in the ribs and spine.

62. (Previously Presented) The method of claim 57 further comprising the step of selecting an atlas from a database of atlases prior to performing said aligning step.

63. (Previously Presented) The method of claim 62 wherein said selecting step is performed manually.

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64. (Previously Presented) The method of claim 62 wherein said selecting step is performed automatically based on the degree of registration of each atlas in said database with said emission tomography images.

65. (Previously Presented) The method of claim 64 wherein the degree of registration is determined by:

performing a preliminary reconstruction of each atlas; and
registering the atlas to the preliminary reconstruction.

66. (Previously Presented) The method of claim 64 further comprising the step of combining multiple atlases to yield a resultant atlas that better registers with said emission tomography images.

67. (Previously Presented) The method of claim 62 wherein said database includes disease specific atlases, physical trait specific atlases and/or tracer or lesion specific atlases.